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2. Asks the pupil to prove Euler's theorem for any polyhedron.

Now by virtue of that peculiar psychological reaction which enabled the slave in the Platonic dialogue to give a Euclidean demonstration, which enables each bright student to satisfy the teacher unless he be ultra-socratic (and almost the only ultra-socratic teacher is the cold hard world) we may be reasonably certain that it will rarely happen that the cube is ever anything but a *Flächenstück* in the course of its construction, or that any polyhedron so improper as not to obey the theorem will be mentioned. The coördination in this case is of the classic type "the blind leading the blind."

Inevitably some obvious connections must be missed, but the omission in Ptolemy's theorem (page 78) of any reference to the theorem on a straight line seems to require explanation.

Occasionally hypotheses necessary to the conclusion are suppressed as in page 51, "Prove $x^3 + y^3 + z^3 > 3xyz$." These can be supplied by telepathy.

The first part of the work is almost entirely on pure mathematics, only one section bearing a title suggesting applications, and this "On the dip of a stratum" might as well have been "Napier's rule of circular parts." The second part contains in the scholarship papers a good deal of mechanics.

In spite of all that has been specially pleaded the book may well serve a useful purpose, mnemonically, and lay some foundations for broader coördinations. This is probably all the author expected. It should be serviceable to a teacher who desires problems not found in the usual run of American texts.

We note a few unimportant misprints, from which the book appears to be unusually free for a first edition. Page 21, line 15; page 46, line 9; page 81, line 2; page 120, line 15; page 124, line 12. The typography and makeup of the book are very good.

R. P. BAKER.

THE UNIVERSITY OF IOWA.

Plane and Spherical Trigonometry with Tables. By GEORGE WENTWORTH and DAVID EUGENE SMITH. Ginn and Co. 230+104 pages. \$1.35.

The total content of this text is practically the same as that of the second revision of Wentworth's *Plane and Spherical Trigonometry*, the principal differences being the addition of a chapter on graphs and the omission of the chapter on "Applications of spherical trigonometry," contained in the older book. Moreover, the general treatment of the subject is the same and the proofs of the individual theorems are, in most cases, identical. In the matter of arrangement, however, the two texts differ materially.

In the present text the authors (as they state in the preface) have followed the rule of "putting the practical before the theoretical." To this end, after defining the trigonometric functions of acute angles, a large amount of space is devoted to problems illustrating the practical uses of each of them, first using natural functions and then logarithms. This covers 76 pages (including a chapter on logarithms) and it is not until page 82 that the student meets the definitions of the functions of angles greater than 90° and begins to get some insight into the

theory of the subject. This will probably appeal to some teachers as carrying a good idea rather far. The so-called "fundamental relations" among the functions play a much less prominent part than in most other modern texts. They are proved on pages 12 and 13, but no special emphasis is laid on them and practically no use is made of them until page 95. Even in the later chapter on identities, the advice to the student as to "how to prove an identity" makes no mention of the use of the fundamental relations. It would seem that the great importance of these relations in later work in mathematics should warrant more effort to impress them upon the memory of the student. Circular measure of angles, inverse functions, graphs and trigonometric identities and equations, as well as the application of trigonometry to algebra are put in later chapters, after the solution of oblique triangles—the logical arrangement both for those who want these subjects and for those who do not.

The book is well printed and bound and presents an attractive appearance. It is quite free from typographical errors, but has two rather surprising mistakes in definition on page 40: In line 1 a logarithm is defined as a *power*, instead of *the exponent of a power*, and in line 19 the statement is made that "any positive, rational number may be taken as the base," thus *including unity* and *excluding e*. Also, the treatment of negative characteristics is likely to be confusing to beginners. But these defects can easily be corrected by any competent teacher, and the book will no doubt receive the same cordial welcome that has been given to others of the same series.

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PROBLEMS AND SOLUTIONS.

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PROBLEMS FOR SOLUTION.

ALGEBRA.

465. Proposed by CYRUS B. HALDEMAN, Ross, Ohio.

Having given $\tan^{-1} 1 = \tan^{-1} \frac{1}{2} + \tan^{-1} \frac{1}{3}$, show that

$$\tan^{-1} 1 = 5 \tan^{-1} \frac{1}{5} + 2 \tan^{-1} \frac{1}{8} + 3 \tan^{-1} \frac{1}{57}.$$

466. Proposed by E. B. ESCOTT, Kansas City, Mo.

For what functions, f , are the following relations true:

$$\text{When } \frac{f(x, y, z)}{X} = \frac{f(y, z, x)}{Y} = \frac{f(z, x, y)}{Z}, \text{ then } \frac{f(X, Y, Z)}{x} = \frac{f(Y, Z, X)}{y} = \frac{f(Z, X, Y)}{z}.$$

467. Proposed by IRA M. DE LONG, The University of Colorado.

Determine the function, f , from the functional relation, $f(x + y) = f(x) + f(y) + 2xy$.